

CORAL REEFS: TEN QUESTIONS - TEN ANSWERS

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1. WHY ARE PEOPLE WORRIED ABOUT CORAL REEFS?

Most of the world's coral reefs are in trouble. Eight years ago scientists reported that some 10% of coral reefs had already been destroyed or degraded beyond likelihood of recovery. Monitoring results from around the world in 1998 and 1999 indicated that less than 30% of coral reefs have completely healthy communities of corals, fish and other species. Coral bleaching in 1997 and 1998 had severe impacts. Large parts of many reefs and some nations lost 90% of their live coral cover, including colonies as much as 1000 years old. In other areas over the past 30 years similar damage has been caused by the coral eating crown of thorns starfish.

Reefs can recover coral cover and species diversity. Nevertheless if urgent action is not taken quickly it seems likely that the combined effect of direct human impacts, crown of thorns starfish predation, coral disease and predicted increased frequency of coral bleaching and severe storm damage will overwhelm the recovery capacity of many reef systems.

For many people this is a crisis calling for immediate action.

2. WHY ARE CORAL REEFS SO IMPORTANT?

Corals have been an important structural feature of reefs in shallow tropical seas since the days of the dinosaurs 100 million years ago. Coral reefs of the type we see today have been around for about 25 million years. They are highly productive and biologically diverse. They are home to members of all the phyla or major groups of the animal kingdom. Put simply, they are a key part of the natural heritage and of the stock of biological diversity of the world.

The productivity of healthy coral reefs sustains a rich interlinked network of species which has been the main source of food and resources for many tropical coastal and island people since the time of the first humans.

The biological diversity of reefs is a natural treasure which may support future activities yet undreamed of. Already reef species are yielding powerful chemicals effective in treatment of disease. In the future reefs may add to the range of species that can be cultivated to provide food, materials and economic support for people of tropical developing countries.

Coral reefs form natural breakwaters protecting the fertile coastal lands and human settlements of many island and continental nations from erosion by storm waves.

The beauty and diversity of coral reefs have long been a source of wonder to coastal and inland people and visiting mariners. For many communities they have a deep cultural aesthetic and spiritual significance.

The development of SCUBA, underwater film and video and new technologies which make reefs accessible to large numbers of visitors has made coral reefs a powerful attraction for tourism. Well managed, tourism provides a sustainable means of earning foreign currency and employment generation for people in remote areas of developing countries.

In many ways coral reefs have become the marine environments most accessible for scientific study and popular appreciation. Because of this ability to use coral reefs as reference and monitoring sites and because they are linked to other marine environments by currents, they are probably good indicators of the state of shallow marine environments throughout the world.

3. WHY ARE CORAL REEFS FACING PROBLEMS?

The majority of reef loss or damage is not deliberate. An international conference of reef managers concluded that ignorance is destroying coral reefs.

Reefs are being destroyed by an accumulation of stresses arising from human activities, on top of long term changes in the oceans and atmosphere, and natural stresses of highly variable seasons, severe storms, earthquakes and volcanic eruptions. In many situations the extra impacts are stressing and overwhelming the resilience or self-repair capacity of reef communities. This is reflected in reports of increased incidence of coral diseases, as well as the more dramatic impacts of widespread coral death.

A small amount of destruction is deliberate. Some reefs are covered with sand, rock and concrete to make cheap land and stimulate economic development. Others are dredged or blasted for their limestone or to improve navigational access and safety.

Most human stresses on reefs come from two causes.

The first is unmanaged fishing which results in overfishing – removing so many fish, that the ecological community is changed: and destructive fishing using chemicals or explosives to target particular species or simply to catch fish when numbers are too low for conventional methods to produce an adequate yield.

The second is pollution – adding types and amounts of chemicals and sediments not normally part of the reef environment.

4. CAN CORAL REEF FISHERIES BE SUSTAINABLE?

Historically, coral reefs have sustained rich local fisheries targeting a range of fish and invertebrate species. Now, technology has made it easier to reach fishing grounds, to find and catch fish and to keep them in good condition until they reach the market. In many areas the demand is exceeding the productive capacity of reef ecosystems, particularly

where those ecosystems are stressed by other human impacts. In some cases the removal of the most attractive food fish, the top predators, has led to major ecological changes in reef ecology.

As fish become hard to catch, fishers in many areas have turned increasingly to destructive techniques such as poisons or explosives, with further damage to reef ecosystems.

Experience suggests that most reefs can sustain some level of fishing over very long periods. There are two key problems. We don't have a scientific basis to recognize when the critical limits have been reached, and new technologies are changing the patterns and impacts of commercial and recreational fisheries so previous knowledge is often of little help.

Recent expansions in the amounts, types and purposes of fishing have been driven by new technologies and new demands. Better transport and aquarium technology for the home or restaurant have built large markets for live fish and invertebrates at prices far beyond those paid in conventional fisheries. The combination of new and old fisheries has overwhelmed the capacity of reefs in many areas.

There is an urgent need to learn how to manage reefs sustainably with adequate sanctuaries, reference sites and breeding areas free from fishing, and to maintain the species diversity and ecosystem processes of the fished areas.

We have to develop means to manage the demand and trade in reef species. In areas which are not sanctuaries, we must consider increasing the sustainable productivity through aquaculture or sea farming to meet the needs of people in many parts of the tropics. There are already examples of successful farming of reef products such as seaweeds and shellfish. Other species are likely to be farmed for food, pharmaceuticals or as aquarium specimens. The challenge is to develop sustainable techniques which do not themselves cause pollution or introduce disease.

5. WHAT ARE THE MAIN POLLUTION PROBLEMS?

The most obvious concerns are about catastrophic events which result in massive releases of oil or chemical into the reef environment. There is clearly a case for managing transport and industry so that operators accept the cost of absolutely minimizing the human error, poor staff training and poor equipment design and maintenance, which cause virtually all catastrophic accidents.

In many ways the chronic effects of poor management of waste disposal and the activities of industry, agriculture, cities, towns, households and gardens are the major concern. Regular release of small amounts of chemicals and sediments in runoff from land, through inadequate waste disposal, poor sewage treatment and minor operational spills of fuels and lubricants from shipping can have subtle and ecologically significant effects. For example, adult coral and fish populations may appear healthy but their reproductive physiology may be affected so that they do not produce viable young. Or the strength of coral skeletons may be reduced because they incorporate less limestone into their

structure. Areas in which apparently healthy communities suffer severe storm damage may not regenerate because settling larvae avoid areas with minute traces of contaminants.

The concern about pollution is that of managing a complex web of effects. It is not generally possible to identify and address a case of a single cause and a single measurable effect. The problem is that shallow seas near inhabited coasts are likely to be subject to low levels of many materials whose individual effects may be very low but whose combined effects may be significant.

6. IS TOURISM A NEW PRESSURE AND A NEW PROBLEM FOR CORAL REEFS?

Well managed tourism can be an ally of coral reef protection. Tourism operations based on enabling visitors to see and appreciate the wonder and diversity of coral reefs have a powerful commercial incentive to ensure that their sites and their reefs are not degraded.

Many of the problems of tourism have come from extreme and ill-considered development with hotels and infrastructure built with no regard for the activities of the tourists who will use them. There are examples of hotels being built from the limestone of the coral reef on their foreshore which was intended to be their major attraction. Developers who will not operate the infrastructure seek to cut costs and damage the coastal environment by inadequate arrangements for waste and sewage disposal. There are also examples of operations with ill trained staff damaging reefs by anchoring and failing to inform guests of the rules of reef usage.

Tourism can be a threat but it has the long term potential for sustainable development and employment benefits to communities in tropical coastal regions. The challenge is to learn effective management so that the measures necessary to protect the environment are recognized and factored into the costs of establishing and continuing tourism operations.

7. IS CORAL BLEACHING A MAJOR PROBLEM?

When corals are stressed they eject the plant cells that normally live in their tissues. This causes the coral to bleach. If the stress eases quickly the corals will recover and reabsorb plant cells and color. If the stress is severe or lasts a long time the coral is likely to die. Coral bleaching has been recorded on several occasions since the 1970's.

Several factors and combinations of factors can cause stress in corals. These include low salinity, presence of pollutants, extremely high or low water temperatures and high light levels – particularly when seas are calm so that light penetrates deep into the water column. High water temperatures seem to be a particularly important cause of stress.

There was a major episode of coral bleaching in 1997 and 1998 when high mid summer water temperatures in parts of all the tropical seas and oceans were followed by reports of widespread and severe coral bleaching and coral death.

The warm water events of 1997 and 1998 were unprecedentedly severe, but the International Panel on Climate Change has advised that as a consequence of observed and predicted atmospheric change, such events are likely to become more frequent.

There are already reports from some areas of reef regeneration from surviving parts of affected coral colonies and through recruitment of coral larvae. We also know that in the warmest parts of their range coral species can survive unbleached in temperatures which cause severe bleaching in cooler areas, but we do not know the process which enables corals to adapt. There is much we do not know about coral bleaching, but it is clearly a major stress response. The prediction of more frequent high temperature stresses adds to the urgent need to reduce or remove as many immediate human stress sources as possible.

8. WHAT CAN WE DO TO SAVE CORAL REEFS?

Communities and governments cannot manage the species and the biological and physical processes of reef ecology.

But we can seek to manage those things that humans do or do not do which damage coral reefs environments and communities.

To do this requires some major changes in many long established thought processes.

We must learn to fish in ways that we can demonstrate to be sustainable without slowly destroying the ecosystem that produces the fish. We can no longer assume that the resources of the sea are limitless and that we can do no harm by unrestrained fishing and collecting. We can develop low impact sustainable aquaculture to produce food and materials.

We must recognize and make specific decisions about the costs of waste disposal. Either we accept the costs of chemical or biological treatment of waste before material is discharged into waterways, or we accept environmental impacts. We can no longer simply assume that the sea is the cheapest and most effective place to dispose of sewage, urban, agricultural and industrial waste.

If we want to save reefs and other marine environments we must develop the means to manage our uses and impacts so that they do not exceed the self repair capacity of those environments. That means reviewing and constraining our expectations of many activities and forms of behaviour which have been regarded as the freedom of the seas.

9. WHAT CAN I DO TO HELP TO SAVE CORAL REEFS?

The most important thing is to spread awareness of the importance of coral reefs and related ecosystems and to encourage communities, companies and governments to take steps to protect them.

You may do this directly or through joining a conservation group. Either way, you can make a difference by encouraging public awareness and discussion of reef issues and by

making your views known to political representatives and key decision makers in your community.

As a tourist or other occasional visitor you can learn beforehand about the reef environment you are visiting and how to ensure that your behaviour minimizes risk of damage to that environment. You can try to ensure through accreditation and reporting systems that any company, resort or operator you select is reef friendly and operates in a sustainable manner. As well as seeking to minimize impacts regular reef users and visitors can become involved in management support groups for marine protected areas. You can establish working groups in cooperation with managers and become involved in reef protection activities, such as installation and maintenance of moorings, litter cleanup and removal of debris and fishing line from reef areas. Or you may seek to be involved in a local monitoring program such as Reef Check to help with global monitoring and to be aware of the condition of the reef areas you use.

Officials and directors of companies that use or operate in reef areas can review their operations, financial strategies and management practices seeking to achieve long term minimum impacts and maximum sustainability. They should also be prepared to consider interactions with conservation needs and other users in developing an integrated approach to problem solving.

Community leaders and decision makers should become familiar with the issues of coral reefs, marine environments and resource protection so that these can be reflected in medium and long term planning and policy. In particular, the issue of incorporating the full environmental and waste management costs of programs and developments should be recognized and addressed early in the policy planning process.

10. WHAT IS THE INTERNATIONAL CORAL REEF INITIATIVE?

The International Coral Reef Initiative (ICRI) is an informal partnership of governments, international organizations, non-government organizations and scientists. It was established out of concern at the degradation of coral reefs and acts as to be a catalyst to develop awareness of the need to protect reefs and to create linkages and programs to manage and conserve them.

ICRI is not a funding body but it has promoted the establishment of and identified and encouraged donors to support the Global Coral Reef Monitoring Network, the International Coral Reef Information Network, and the conduct of the International Tropical Marine Ecosystems Management Symposium. At the international level, ICRI operates to ensure that the issues affecting coral reefs are raised and considered in development, implementation and review by the widest possible range of international programs and forums – such as the United Nations Commission on Sustainable Development. Management and protection of coral reefs is not simply an environmental issue. It cannot occur without considering the broad range of social and economic issues which affect communities, and the coastal areas and river systems which drain into them. Most effective reef management will be based on community commitment and

understanding of need to ensure the long term sustainability of reef ecosystems, natural resource use management and conservation at the local level.